PCDD/PCDF in Food Samples of Egypt (Preliminary Study)

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INTRODUCTION

Food is considered to be the major source for human exposure to polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF). Recent surveys from Germany showed that food contributes to about 90 to 95 % of the daily PCDD/PCDF-intake of man. Here, food samples of animal origin cause about 90 % of the whole daily PCDD/PCDF-intake (1-2).

In Egypt, recently the consumption of some meat products has been widely spread as a result of economic and social considerations. Such products were more than ten, but the most common and popular ones are luncheon, burgers, sausage, soft and rough minced meat. Additionaly, butter is an important food of animal origin, also. As preliminary study, meat product and butter samples as examples for food of animal origin and margarine as example for vegetable food were analyzed.

To our best of knowledge, this is the first survey of Egyptian food samples. The general idea of this preliminary study was to find out whether there are any remarkable results worth for a closer look and further investigations.

MATERIALS AND METHODS

26 samples of meat products were collected from markets of three provinces of Egypt, namely Cairo, Giza and Kaliobia at random during March and April, 1994. These provinces reflect the situation in Cairo and its surrounding area. The samples represent the

most commonly spread meat products in Egypt, namely luncheon, burger, sausage, soft and rough minced meat which were prepared by 5 major producers.

8 butter samples were collected from other parts of the country: two from El-Fayoum district, one from Bany Swif district, two from Lower Egypt, one from Upper Egypt and two from El-Monofia district. Moreover, 2 margarine samples were collected in Cairo.

The basic steps of the analytical procedure for determination of PCDD/PCDF are presented elsewhere (3-4). Meat samples were freeze dryed and Soxhlet extracted with cyclohexane/toluene (1+1). The pure butter fat could be analyzed directly. The following steps start with spiking of the fat with all 13C-labeled PCDD/PCDF as described in ref. 3 and 4.

RESULTS AND DISCUSSION

Figure 1 gives the frequency distribution of the PCDD/PCDF-contamination of the meat product samples (in pg I-TEQ/g fat). The mean of the 26 samples was 0.94 pg I-TEQ/ g fat. 25 samples had a contamination below 1.5 pg I-TEQ/g fat; one sample of 3.33 pg I-TEQ/g fat. The meat products had fat amounts between 10 and 40 % of dry weight (in the mean 21 %).

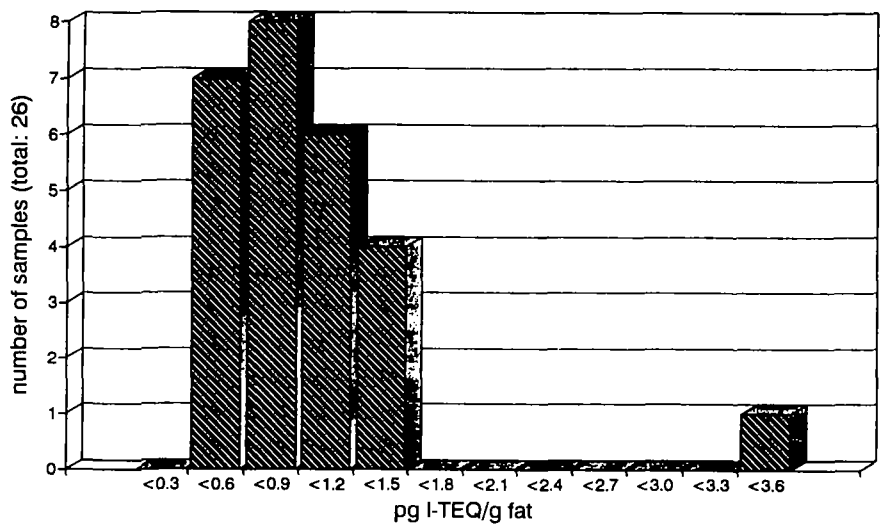

Figure 1. Frequency distribution of PCDD/PCDF-contamination in meat products samples of Egypt (Cairo and surrounding areas) (in pg I-TEQ/g fat)

The results of the butter and margarine samples are given in table 1. With respect of the wide range of the PCDD/PCDF-contamination and the low number of samples of each region, no further statistical paramaters (as average or frequency distribution) were calculated.

sample	origin	pg I-TeQ/g fat
butter-1	El-Fayoum district	1.84
butter-2	El-Fayoum district	1.83
butter-3	Bany Swif district	0.41
butter-4	Lower Egypt	10.15
butter-5	Lower Egypt	28.93
butter-6	Upper Egypt	2.42
butter-7	El-Monofia district	8.55
butter-8	El-Monofia district	3.13
margarine-1	Cairo	0.47
margarine-4	Cairo	0.33

Table 1. Results of PCDD/PCDF-contamination of butter and margarine samples of different regions of Egypt

For comparison, the following tolerances are recommended in Germany for milk and milk products (in pg I-TEQ/g fat): < 0.9 as aspired objective; > 3 recommendation for restriction of consumption and examination of possible sources; > 5 prohibition of consumption (5). At present, there are no further tolerances for other food samples in Germany. Although Egypt has not fixed any PCDD/PCDF-tolerances for food samples up to now, these German tolerances can be used to find out whether increased levels of food contamination occur.

The results of the 8 butter samples showed a wide range of PCDD/PCDF-contamination: Whereas the butter samples from El-Fayoum district, Bany Swif district and Upper Egypt are below 3 pg I-TEQ/g fat, the two samples of the El-Monofia district have 5.8 pg I-TEQ/g fat in the mean (average of 3.13 and 8.55) and of Lower Egypt 19.5 pg I-TEQ/g fat in the mean (average of 10.15 and 28.93). These relatively high amounts indicate local sources. However, further investigations are recommended to detect the sources of contamination.

The German tolerances for milk and milk products cannot be

applied to meat products. Data for calculation of carry over-factors into milk fat or meat fat are contradictory (6). According to an overview of contamination in German food samples collected between 1986 and 1991, beef meat had about 2.7 pg I-TEQ/g fat, whereas milk had 1.8 and butter 1.1 pg I-TEQ/g fat (1). Although adipose tissue and milk fat do not have exactly the same PCDD/PCDF-concentration (expressed in pg/g fat), it can be expected that meat and milk samples of a specific animal are contaminated with PCDD/PCDF in the same order of magnitude. Therefore, these tolerances can be used for an orientating evaluation of the meat contamination, also. Regarding these levels, the meat products collected in Cairo and its surrounding area show a relatively low PCDD/PCDF-contamination.

The PCDD/PCDF-contamination of two margarine samples is low, also.

CONCLUSION

This preliminary study leads to suggest

- that meat products sold in Cairo and its surrounding area have a low PCDD/PCDF-contamination;
- that two margarine samples sold in Cairo are low contaminated with PCDD/PCDF, also;
- that butter samples from different areas of Egypt have a wide range of PCDD/PCDF-contamination. Whereas samples from some areas meet tolerances set in Germany for milk and milk products, other exceed these tolerances. Further investigations are necessary to detect the sources of the PCDD/PCDF-contamination of the environment.

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